

**U.S. DEPARTMENT OF ENERGY  
DEPARTMENT-WIDE  
FUNCTIONAL AREA QUALIFICATION STANDARD**

# **ENVIRONMENT, SAFETY, AND HEALTH RESIDENT QUALIFICATION STANDARD**

**Defense Nuclear Facilities Technical Personnel**



**U.S. Department of Energy  
Washington, D.C. 20585**

**May 1995**

## **Approval and Concurrence**

The Assistant Secretary for Environment, Safety, and Health is the Management Sponsor for the Department-wide Environment, Safety, and Health Resident Functional Area Qualification Standard. The Management Sponsor is responsible for reviewing the Qualification Standard to ensure that the technical content is accurate and adequate for Department-wide application. The Management Sponsor, in coordination with the Human Resources organization, is also responsible for ensuring that the Qualification Standard is maintained current. Concurrence with this Qualification Standard by the Assistant Secretary for Environment, Safety, and Health is indicated by the signature below.

The Technical Personnel Program Coordinator (TPPC) is responsible for coordinating the consistent development and implementation of the Technical Qualification Program throughout the Department of Energy. Concurrence with this Qualification Standard by the Technical Personnel Program Coordinator is indicated by the signature below.

The Technical Excellence Executive Committee (TEEC) consists of senior Department of Energy managers. This Committee is responsible for reviewing and approving the Qualification Standard for Department-wide application. Approval of this Qualification Standard by the Technical Excellence Executive Committee is indicated by the signature below.

NOTE: The signatures below reflect concurrence and approval of this Qualification Standard for interim implementation. Final concurrence and approval will occur in December 1995, pending comments received based upon implementation.

### **CONCURRENCE:**

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Assistant Secretary for  
Environment, Safety, and Health

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Technical Personnel Program  
Coordinator

### **APPROVAL:**

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Chairman  
Technical Excellence Executive Committee

## CONTENTS

PURPOSE .....	1
APPLICABILITY .....	1
IMPLEMENTATION REQUIREMENTS .....	1
DUTIES AND RESPONSIBILITIES .....	3
BACKGROUND AND EXPERIENCE .....	4
REQUIRED COMPETENCIES .....	4
1.    GENERAL TECHNICAL .....	5
2.    REGULATORY .....	25
3.    ADMINISTRATIVE .....	39
4.    MANAGEMENT, ASSESSMENT, AND OVERSIGHT .....	40
EVALUATION REQUIREMENTS .....	46
CONTINUING TRAINING AND PROFICIENCY REQUIREMENTS .....	46

**U.S. DEPARTMENT OF ENERGY  
FUNCTIONAL AREA QUALIFICATION STANDARD**

**FUNCTIONAL AREA**

**Environment, Safety, and Health (EH) Resident**

**PURPOSE**

The Technical Qualification Program is divided into three levels of technical competence and qualification. The General Technical Base Qualification Standard establishes the base technical competence required of all Department of Energy defense nuclear facility technical personnel. The Functional Area Qualification Standards build on the requirements of the General Technical Base Qualification Standard and establish Department-wide functional competence requirements in each of the identified functional areas. Office/facility-specific qualification standards establish unique operational competency requirements at the Headquarters or Field element, site, or facility level.

The EH Resident Functional Area Qualification Standard establishes common functional area competency requirements for all Department of Energy EH Resident personnel who provide management oversight or direction impacting the safe operation of defense nuclear facilities. Satisfactory and documented completion of the competency requirements contained in this Standard ensures that EH Residents possess the minimum requisite competence to fulfill their EH Resident-related duties and responsibilities.

Each EH Resident is also required to complete a Functional Area Qualification Standard consistent with their EH assigned technical specialty. The applicable Functional Area Qualification Standard will be determined and assigned by the EH Resident's line management. Completion of the competency requirements contained in these Standards provides the functional foundation to assure successful completion of the appropriate Office/facility-specific qualification standard.

**APPLICABILITY**

This Standard applies to all Department of Energy EH Residents who provide oversight of the safe operation of defense nuclear facilities. Personnel designated by Headquarters as participants in the EH Resident Technical Qualification Program are required to satisfy the competency requirements of this Standard as defined in DOE Order 3410, Training.

**IMPLEMENTATION REQUIREMENTS**

The competency requirements contained in the Standard are divided into the following four categories:

1. General Technical
2. Regulatory
3. Administrative
4. Management, Assessment, and Oversight

Each of the categories is defined by one or more competency statements indicated by bold print. The competency statements define the expected knowledge and/or skill that an individual must possess and are requirements. Each of the competency statements is further explained by a

listing of supporting knowledge and/or skill statements. The supporting knowledge and/or skill statements are not requirements and do not necessarily have to be fulfilled to meet the intent of the competency.

The competencies identify a familiarity level, a working level, or an expert level of knowledge; or they require the individual to demonstrate the ability to perform a task or activity. These levels are defined as follows:

**Familiarity level** is defined as basic knowledge of or exposure to the subject or process adequate to discuss the subject or process with individuals of greater knowledge.

**Working level** is defined as the knowledge required to monitor and assess operations/activities, to apply standards of acceptable performance, and to reference appropriate materials and/or expert advice as required to ensure the safety of Departmental activities.

**Expert level** is defined as a comprehensive, intensive knowledge of the subject or process sufficient to provide advice in the absence of procedural guidance.

**Demonstrate the ability** is defined as the actual performance of a task or activity in accordance with policy, procedures, guidelines, and/or accepted industry or Departmental practices.

Headquarters and Field elements shall establish a program and process to ensure that all defense nuclear facility technical personnel required to participate in the Technical Qualification Program meet the competency requirements contained in this Standard. Documentation of the completion of the requirements of this Standard shall be included in the employee's training and qualification record.

In select cases, it may be necessary to exempt an individual from completing one or more of the competencies in this Functional Area Qualification Standard. Exemptions from individual competencies shall be justified and documented in accordance with DOE Order 3410, Training. Exemptions shall be requested by the individual's immediate supervisor, and approved one level above the individual's immediate supervisor.

Equivalencies may be granted for individual competencies based upon an objective evaluation of the employee's prior education, experience, and/or training. Documentation of equivalencies shall indicate how the competency requirements have been met. The supporting knowledge and/or skill statements should be considered when evaluating an individual's ability with respect to each competency requirement.

Training shall be provided to employees in the Technical Qualification Program who do not meet the competencies contained in the qualification standard. Departmental training will be based upon supporting knowledge and/or skill statements similar to the ones listed for each of the competency statements. Headquarters and Field elements should use the supporting knowledge and/or skill statements as a basis for evaluating the content of any training courses used to provide individuals with the requisite knowledge and/or skill required to meet the intent of the qualification standard competency statements.

## **DUTIES AND RESPONSIBILITIES**

The following are duties and responsibilities normally expected of defense nuclear facility technical personnel assigned to the EH Resident functional area:

- A. Verify, through surveillance, that Department of Energy line organizations at the site have developed and implemented effective Environment, Safety and Health (ES&H) and Safeguards and Security (S&S) programs.
- B. Establish and maintain a day-to-day, on-site presence to observe Environment, Safety and Health and Safeguards and Security practices in the workplace.
- C. Observe and appraise conditions and provide data to support the development and ensure the accuracy and currency of site profiles.
- D. Evaluate the effectiveness of the Department line and Management and Operating (M&O) contractor management in implementing corrective actions to address identified weaknesses.
- E. Determine whether qualified personnel have been assigned to implement effective Environment, Safety and Health and Safeguards and Security programs.
- F. Report potential nuclear safety violations under the Price-Anderson Amendments Act of 1988.
- G. Evaluate Department line management's implementation of the operational readiness review and accident investigation processes.
- H. Observe and appraise operations during actual emergencies and exercises; notify the Office of the Deputy Assistant Secretary for Independent Oversight and Appraisals of significant emergencies in accordance with established procedures.
- I. Keep senior EH management informed of significant Environment, Safety and Health and Safeguards and Security issues.
- J. Report the results of surveillance, reviews, and routine site activities in accordance with established procedures.
- K. Provide input to and facilitate the professional aspects of inspections, reviews, and special studies conducted by the independent oversight organization at the assigned site and at other sites as required.
- L. Serve as the EH point-of-contact, the EH resident duty officer, and subject matter/technical expert for site-related activities as assigned.
- M. Maintain professional and facility access qualifications.

Additional duties and responsibilities specific to the site, facility, operational activities, and/or other involved organizations shall be contained in the facility-specific qualification standard(s).

## **BACKGROUND AND EXPERIENCE**

The U.S. Office of Personnel Management's Qualification Standards Handbook establishes minimum education, training, experience, or other relevant requirements applicable to a particular occupational series/grade level, as well as alternatives to meeting specified requirements.

The preferred education and experience for an EH Resident is:

1. Education:

Bachelor of Science degree in industrial hygiene, occupational safety, nuclear engineering, radiation protection or engineering or meet the alternative requirements specified in the Qualifications Standards Handbook.

2. Experience:

Field assessment/oversight experience that has provided specialized experience in environment, safety, and/or health. Specialized experience may be demonstrated through possession of the competencies outlined in this Standard.

## **REQUIRED COMPETENCIES**

The competency requirements contained in this Standard are distinct from those competency requirements contained in the General Technical Base Qualification Standard. All EH Residents must complete the competency requirements of the General Technical Base Qualification Standard prior to or in parallel with the completion of the competency requirements contained in this Standard. Each of the competency statements defines the level of expected knowledge and or skill that an individual is required to possess to meet the intent of this Standard. The supporting knowledge and/or skill statements further describe the intent of the competency statements but are not requirements.

## **1. GENERAL TECHNICAL**

### **1.1 EH Residents shall demonstrate a familiarity level knowledge of basic hydraulic system components and operation.**

#### Supporting Knowledge and/or Skills

- a. Define the following terms and discuss their relationship:
  - Force
  - Pressure
  - Receiver
  - Accumulator
  - Actuator
- b. Describe the basic operation of a hydraulic system.
- c. Discuss how energy in a hydraulic system is converted to work.
- d. Discuss the purpose and basic construction of a hydraulic receiver.
- e. Discuss the purpose and basic construction of a hydraulic accumulator.
- f. Identify and discuss the hazards associated with hydraulic systems and their components.

### **1.2 EH Residents shall demonstrate a familiarity level knowledge of pneumatic system components and operation.**

#### Supporting Knowledge and/or Skills

- a. Define the following terms and discuss their relationship:
  - Dew point
  - Dehydrator
  - Dew point indicator
  - Actuator
- b. Describe the basic operation of an air compressor and a pneumatic system.
- c. Discuss how energy in a pneumatic system is converted to work.
- d. Identify and discuss the general hazards associated with pneumatic systems and their components.
- e. Given a piping and instrumentation drawing of a typical facility instrument air system, identify the main components to include:
  - Compressor
  - Dehydrator
  - Receivers
  - Unloader



**1.3 EH Residents shall demonstrate a familiarity level knowledge of heat exchanger construction and operation.**

Supporting Knowledge and/or Skills

- a. Describe the types of heat exchanger construction.
- b. Describe hot and cold fluid flow in parallel-flow, counter-flow, and cross-flow heat exchangers.
- c. Discuss the following heat exchanger applications:
  - Air conditioner evaporator
  - Preheater
  - Radiator
  - Air conditioner condenser
  - Cooling tower

**1.4 EH Residents shall demonstrate a familiarity level knowledge of pump components and operation.**

Supporting Knowledge and/or Skills

- a. Define the following terms as they relate to pumps:
  - Head
  - Net positive suction head
  - Cavitation
  - Shut-off head
  - Run-out
  - Centrifugal pump
  - Positive displacement pump
- b. Describe the general principle of operation for centrifugal pumps.
- c. Describe the general principle of operations for positive displacement pumps.
- d. Given a cutaway drawing of a centrifugal pump, identify the following components and discuss their purpose:
  - Impeller
  - Packing or mechanical seal
  - Volute
- e. Discuss why centrifugal pumps should always be started against a shut-off head.
- f. Discuss the concept of pump cavitation and describe its harmful effects.
- g. State the dangers to personnel and equipment associated with starting a positive displacement pump against a shut-off head.

**1.5 EH Residents shall demonstrate a familiarity level knowledge of valve construction and operation.**

Supporting Knowledge and/or Skills

- a. Define the following terms as they relate to valves:
  - Disc
  - Seat
  - Body
  - Actuator
- b. Using a diagram of a valve, describe its normal design application in a piping system and identify which of the following general types of valve it is:
  - Gate
  - Globe
  - Ball
  - Check
  - Butterfly
  - Regulating/reducing
- c. Describe the types of valves that are used to throttle flow.
- d. Describe the how the following valve actuators are used to control valve position:
  - Manual
  - Electric motor
  - Pneumatic
  - Hydraulic
- e. Define the following terms as they apply to safety and relief valves:
  - Set point
  - Pilot-actuated
- f. Describe the purpose, operation and typical application of safety and relief valves.

**1.6 EH Residents shall demonstrate a working level knowledge of the construction, operation, and theory of basic heating, ventilation, and air conditioning (HVAC) systems.**

Supporting Knowledge and/or Skills

- a. Given a one-line diagram of an heating, ventilation, and air conditioning system, identify the following components and discuss their purpose:
  - Blowers
  - Fans
  - Dampers
  - Chillers
  - Filters
  - Heat exchangers
  - Scrubbers
  - Hoods
  - Glove boxes
  - Pressure sensors
- b. Compare and contrast the design, operation, and application of axial-flow and radial-flow fans.
- c. Discuss the relationships between the following in heating, ventilation, and air conditioning systems:
  - Supply ventilation
  - Flow
  - Exhaust ventilation
- d. Describe the purpose of the heating, ventilation, and air conditioning system in the following applications:
  - Hoods
  - Glove boxes
  - Hot cells
  - Confinement systems
- e. Identify and discuss when maintaining a negative heating, ventilation, and air conditioning system pressure is desirable.
- f. Describe the use of heating, ventilation, and air conditioning in controlling the spread of hazardous material and radioactive contamination.
- g. Describe the application and use of heating, ventilation, and air conditioning as an Engineered Safety Feature.

**1.7 EH Residents shall demonstrate a familiarity level knowledge of basic electrical terminology.**

Supporting Knowledge and/or Skills

- a. Discuss the following terms:
  - Conductor
  - Insulator
  - Resistor
  - Electromagnetic force
  - Electrostatic field
- b. Describe the following parameters and discuss their relationship:
  - Voltage
  - Current
  - Resistance
  - Power
  - Inductance
  - Capacitance

**1.8 EH Residents shall demonstrate a familiarity level knowledge of basic electrical fundamentals of direct current (DC).**

Supporting Knowledge and/or Skills

- a. Discuss the basic principle by which the following components produce direct current (DC):
  - Battery
  - Direct current (DC) generator
  - Thermocouple
- b. Discuss the purpose of a rectifier.
- c. Discuss the following terms:
  - Resistivity
  - Electric circuit
  - Series circuit
  - Parallel circuit
- d. Discuss the following terms:
  - Battery
  - Electrode
  - Electrolyte
  - Ampere-hour
  - Specific gravity
- e. Describe in basic terms what happens when a lead-acid battery is charged and discharged.
- f. Describe the hazards associated with lead-acid storage batteries.

**1.9 EH Residents shall demonstrate a familiarity level knowledge of basic electrical fundamentals of alternating current (AC) and electrical distribution systems.**

Supporting Knowledge and/or Skills

- a. Discuss the basic theory of operation of an alternating current (AC) generator.
- b. Discuss the reasons that three-phase power systems are used in industry.
- c. Discuss the basic theory of operation of an alternating current (AC) motor.
- d. Discuss the purpose and functions of the following:
  - Transformer
  - Motor controller
  - Fuses and circuit breakers
- e. Explain the following terms as they apply to electrical distribution systems:
  - Single-line diagram
  - Diesel power
  - Neutral grounding
  - Protective relays

**1.10 EH Residents shall demonstrate a familiarity level knowledge of process instrumentation and control system principles of operation, purpose and uses.**

Supporting Knowledge and/or Skills

- a. Explain the reasons for measuring temperature, pressure, flow, and fluid level.
- b. List the three basic functions that temperature, pressure, flow, and fluid level detectors provide.
- c. Define and discuss the application of each of the following:
  - Control system
  - Control system input
  - Control system output
  - Open-loop control system
  - Control system feedback
  - Closed-loop control system
- d. Describe an automatic control system including the four functions required for an automatic control system to operate.
- e. Referring to a basic block diagram of a control system, explain the function of the elements.

**1.11 EH Residents shall demonstrate a familiarity level knowledge of the fundamentals of chemical bonding, chemical reactions, and use of the periodic table.**

Supporting Knowledge and/or Skills

- a. Discuss the following types of chemical bonds:
  - Ionic
  - Covalent
  - Metallic
- b. Discuss how elements combine to form chemical compounds.
- c. Discuss the following terms:
  - Mixture
  - Solvent
  - Solubility
  - Solute
  - Solution
  - Equilibrium
- d. Discuss the following terms:
  - Density
  - Molarity
  - Parts per million (ppm)
- e. Define the following terms:
  - Acid
  - Base
  - pOH
  - Salt
  - pH
- f. Given a periodic table, identify and explain the significance of the arrangement of elements, to include the following:
  - Periods of the table
  - Classes of the table
  - Group characteristics

**1.12 EH Residents shall demonstrate a familiarity level knowledge of the chemical fundamentals of corrosion and water treatment.**

Supporting Knowledge and/or Skills

- a. Explain the process of general corrosion of iron and steel when exposed to water.
- b. Discuss the two conditions that can cause galvanic corrosion.
- c. Discuss the following types of specialized corrosion:
  - Pitting corrosion

- Stress corrosion cracking
  - Crevice corrosion
- d. Discuss the reasons for removing impurities from water prior to use in nuclear systems.
- e. Explain the ion exchange process.
- f. Discuss the basic processes involved in the corrosion of materials exposed to acids, bases, and other hazardous chemicals.

**1.13 EH Residents shall demonstrate a familiarity level knowledge of basic concepts and theories of thermodynamics, heat transfer and fluid flow.**

Supporting Knowledge and/or Skills

- a. Define the following terms:
- Specific volume
  - Density
  - Specific gravity
  - Mass
  - Weight
- b. Describe the thermodynamic properties of temperature and pressure.
- c. Describe the following types of thermodynamic systems:
- Isolated system
  - Open system
  - Closed system
- d. Discuss the First Law of Thermodynamics.
- e. Discuss the Second Law of Thermodynamics.
- f. Using the ideal gas law, discuss the relationship between pressure, temperature, and volume.
- g. Describe when a fluid may be considered to be incompressible.
- h. Describe the effects of pressure and temperature changes on confined fluids.
- i. Describe the three modes of heat transfer.

**1.14 EH Residents shall demonstrate the ability to read and interpret engineering piping and instrumentation drawings (P&ID).**

Supporting Knowledge and/or Skills

- a. Identify the symbols used on engineering piping and instrumentation drawings for:
- Types of valves

- Types of valve operators
  - Types of eductors and ejectors
  - Basic types of instrumentation
  - Types of instrument signal controllers and modifiers
  - Types of system components (pumps, etc.)
  - Types of lines
- b. Identify the symbols used on engineering piping and instrumentation drawings to denote the location of instruments, indicators, and controllers.
  - c. Identify how valve conditions are depicted.
  - d. Determine system flowpath(s) for a given valve lineup.
  - e. Given a fluid power drawing, determine the operation or resultant action of the stated component when hydraulic pressure is applied/removed.

**1.15 EH Residents shall demonstrate the ability to read and interpret basic electrical diagrams and schematics.**

Supporting Knowledge and/or Skills

- a. Identify the symbols used on engineering electrical drawings.
- b. Identify the symbols and/or codes used on engineering electrical drawings to depict the relationship between components.
- c. State the condition in which all electrical devices are shown, unless otherwise noted on the diagram or schematic.

**1.16 EH Residents shall demonstrate a familiarity level knowledge of statistical sampling procedures.**

Supporting Knowledge and/or Skills

- a. State the definition of the following statistical terms:
  - Mean
  - Median
  - Mode
  - Variance
  - Mean variance
  - Standard deviation
- b. Explain the structure of a normal distribution (bell) curve.
- c. Describe the structure of a log normal distribution.
- d. Given data, calculate the probability of an event.
- e. Describe the following sampling procedures, include an example and the advantages and disadvantages of each:



- Simple random sampling from finite populations
  - Stratified sampling
  - Cluster sampling
  - Systematic sampling
  - Acceptance sampling
- f. Discuss the terms "confidence interval" and "confidence limit."

**1.17 EH Residents shall demonstrate a working level knowledge of safety precautions and hazards associated with chemicals, compounds, and compressed gases.**

Supporting Knowledge and/or Skills

- a. Discuss the hazards associated with the use of corrosives (acids and alkalies).
- b. Describe the general safety precautions necessary for the handling, storage, and disposal of corrosives.
- c. Discuss the general safety precautions for toxic compounds.
- d. Given a list of compounds, apply appropriate criteria to determine if a compound is a health hazard and discuss the methods by which toxic compounds may enter the body.
- e. Discuss the safety precautions for working with cryogenic liquids.
- f. Describe the general safety precautions regarding the use, handling, and storage of flammable and combustible materials.
- g. Given a specific scenario involving combustible/flammable material spill, describe the required response. Include containment and notification actions.
- h. Describe the requirements for safe storage and use of the following compressed gases (include flammability and cryogenic considerations):
  - Oxygen
  - Acetylene
  - Hydrogen
  - Nitrogen
- i. Describe the general requirements for the storage of hazardous chemicals (toxic, reactive and corrosive). Include in your discussion venting/ventilation, drainage, construction, and location.
- j. Given a specific activity involving hazardous chemicals, describe the specialized personal protective equipment required.
- k. Given examples of specific chemicals, discuss their compatibility and any potential hazards associated with mixing.
- l. Describe the safety considerations and hazards associated with the following asbestos-related activities:

- Removal or encapsulation
- Spill and cleanup
- Transportation, storage or containment
- Disposal

**1.18 EH Residents shall demonstrate the ability to recognize fall hazards and identify the appropriate protective measures and/or systems.**

Supporting Knowledge and/or Skills

- a. Describe the requirements for using fall protection equipment.
- b. Identify the types of fall protection systems/gear.
- c. Given a piece of fall protection equipment, identify the inspection requirements, testing/load ratings, and user training required.

**1.19 EH Residents shall demonstrate a working level knowledge of the requirements for using personal protective equipment (PPE).**

Supporting Knowledge and/or Skills

- a. Describe the principles governing the selection, use and limitations of the following:
  - Respirators
  - Protective clothing
  - Hearing protection devices
- b. Describe the various types of personal equipment (devices or clothing) worn to protect a worker from chemical exposure, radiological exposure, and physical injury.
- c. Given a work procedure and atmospheric conditions, identify the appropriate type of respiratory protection for the activity.
- d. Discuss the following terms as applied to the selection of respiratory equipment:
  - Time weighted average
  - Short-term exposure limit
  - Threshold limit values
  - Immediately dangerous to life and health
  - Revised exposure limits
  - Protection factor
  - Derived air concentration
- e. Describe the four levels of protection defined by the Environmental Protection Agency for workers at hazardous waste sites or those workers conducting emergency response activities.

**1.20 EH Residents shall demonstrate a familiarity level knowledge of the safety hazards associated with welding.**

Supporting Knowledge and/or Skills

- a. Describe the operation and specific hazards associated with the following types of welding processes:
  - Shielded
  - Arc
  - Resistance
  - Gas
- b. Identify the confined space precautions and mechanical ventilation requirements for welding activities.
- c. Discuss the fire prevention precautions during welding activities.
- d. Discuss the precautions and requirements for storage and use of compressed gas cylinders used for welding.

**1.21 EH Residents shall demonstrate a familiarity level knowledge of the safety hazards associated with materials handling and storage.**

Supporting Knowledge and/or Skills

- a. Describe the safety hazards associated with crane and gantry operation during material handling and storage activities.
- b. Describe the purpose of the load rating.
- c. Describe the purpose of the Safety Bulletin on Suspect/Substandard Parts.
- d. Discuss the limitations associated with stacking material.
- e. Discuss the preventive measures to avoid the following storage area hazards:
  - Tripping
  - Fire
  - Explosion
  - Spills

**1.22 EH Residents shall demonstrate a familiarity level knowledge of the safety hazards associated with machinery and machine guarding.**

Supporting Knowledge and/or Skills

- a. Given a specific type of machine, identify the potential hazards and appropriate guards associated with the following:
  - Pinch points
  - Point of operation
  - Reciprocating components
  - Rotating components
- b. Describe the purpose and typical use of each of the following types of barriers:
  - Physical
  - Location (distance)
  - Electronic
  - Magnetic
  - Procedural/administrative controls
  - Special tools

**1.23 EH Residents shall demonstrate a familiarity level knowledge of the safety hazards associated with hand and portable tools.**

Supporting Knowledge and/or Skills

- a. Describe the general requirements for safe operation of hand and portable tools.
- b. Describe the purpose of the following types of protection associated with hand and portable tools:
  - Constant pressure switch
  - Grounding
  - Personal protective equipment
  - Procedural/administrative controls
  - Shutoff device

**1.24 EH Residents shall demonstrate a familiarity level knowledge of the safety hazards associated with walking and working surfaces.**

Supporting Knowledge and/or Skills

- a. Describe the general requirements for safe operation of the following work areas or activities:
  - Aisles and passageways
  - Floors and wall openings and holes
  - Housekeeping
- b. Describe the safety requirements for stair and handrail construction.
- c. Describe the safety requirements for construction, care, and use of ladders.
- d. Describe the general safety requirements for construction, overhead protection, and use of scaffolds.

**1.25 EH Residents shall demonstrate a working level knowledge of hazard communication (HAZCOM).**

Supporting Knowledge and/or Skills

- a. Discuss the goals, actions, and employer requirements specified by the Occupational Safety and Health Administration Hazard Communication Standard.
- b. Describe the purpose of a written Hazard Communication Program.
- c. Describe the content and use of material safety data sheets (MSDS).
- d. Describe the proper labeling requirements for hazardous material. Include the size, location, and content/description.
- e. Discuss the content and use of the National Fire Protection Association Diamond for labeling hazardous material.

**1.26 EH Residents shall demonstrate a working level knowledge of electrical safety.**

Supporting Knowledge and/or Skills

- a. Discuss the different requirements for operation and worker qualifications for high versus low voltage. Include procedural differences such as resetting trips.
- b. Describe the following elements of safe work practices for electrical workers:
  - Work planning
  - Work package, including procedures
  - Personal protective equipment
  - Training/qualification
- c. Given a piece of electrical equipment, discuss the potential sources of shock hazards, the degree of the hazard associated with different equipment, and preventive measures required.
- d. Discuss the potential severity of an electrical shock based on the current flow, current path, and the circuit interrupt speed of any overcurrent or ground fault devices in the circuit.
- e. Describe the difference between equipment grounding, system grounding, and grounding.
- f. Describe the purpose and operation of a ground fault circuit interrupter (GFCI).

**1.27 EH Residents shall demonstrate a familiarity level knowledge of fire suppression systems.**

Supporting Knowledge and/or Skills

- a. Discuss the safety concerns associated with the use of the following gas-based fire suppression systems:
  - Halon
  - Carbon dioxide
  - Halon alternatives
  - Argon
  - Nitrogen
  - Localized vs. flooding

- b. Discuss the safety concerns associated with the use of the following chemical-based fire suppression systems:
  - Dry chemical
  - Wet chemical
- c. Discuss the safety concerns associated with the use of the following manual fire suppression systems:
  - Portable extinguisher
  - Stand pipe/hose system
- d. Discuss the following requirements for fire doors:
  - Labeling
  - Fusible links
  - Closing devices

**1.28 EH Residents shall demonstrate a familiarity level knowledge of the safety hazards associated with means of egress.**

Supporting Knowledge and/or Skills

- a. Discuss the requirements for exits.
- b. Discuss the following elements of an Emergency Action Plan:
  - Escape procedures and routes
  - Employee accountability
  - Means of reporting emergencies
  - Persons to contact for information
- c. Describe the requirements for the following elements of an Emergency Action Plan:
  - Staging areas
  - Alarms
  - Postings
  - Drills and training

**1.29 EH Residents shall demonstrate a familiarity level knowledge of safety in specialized construction activities.**

Supporting Knowledge and/or Skills

- a. Describe the hazards and protective systems and how they apply to the following areas associated with trenching and excavation:
  - Soil characterizations
  - Shoring
  - Access
  - Confined space

- b. Describe the special safety considerations for the following activities involved in steel erection.
  - . Elevated work/fall protection
  - . Material handling equipment
  - . Rigging applications
  - . Load paths
- c. Discuss the safety requirements for construction activities involving concrete and masonry. Include construction of forms and handling of equipment.

**1.30 EH Residents shall demonstrate a familiarity level knowledge of Department of Energy radiation protection requirements sufficient to assess the effectiveness of radioactive material containment, exposure control, and radiological work practices.**

Supporting Knowledge and/or Skills

- a. Discuss the relevant Departmental requirements related to the following radiological control elements:
  - . Contamination control
  - . Radiation work permits
  - . Radiation safety training
  - . Posting and labeling
  - . Respiratory protection
  - . Records
  - . X-Ray generating devices
- b. Describe and explain the radiological concerns in the design, construction, and operation of containment and confinement systems.
- c. Discuss the design and operational characteristics of containment and confinement systems that minimize personnel radiation exposure.

**1.31 EH Residents shall demonstrate a familiarity level knowledge of the systems and components for radiation detection, exposure monitoring, and contamination monitoring.**

Supporting Knowledge and/or Skills

- a. Discuss the operation and application of continuous air monitors (CAMs) and area radiation monitors (ARMs).



- b. Discuss the following exposure monitoring dosimetry:
  - Internal dosimetry
  - External dosimetry
  - Nuclear accident dosimetry
- c. Discuss the operation and application of process radiation monitors.
- d. Discuss the operation and application of personnel contamination monitors (automated and hand-held).

**1.32 EH Residents shall demonstrate a familiarity level knowledge of "as low as reasonably achievable" (ALARA) principles.**

Supporting Knowledge and/or Skills

- a. Describe the components of an effective "as low as reasonably achievable" program including time, distance, shielding, and engineering and management controls.
- b. Discuss the essential elements of the job planning process and the post-job "as low as reasonably achievable" review for work performed in a radiation or radioactive contamination area.
- c. Discuss the good practices associated with radiation worker job performance.

**1.33 EH Residents shall demonstrate a familiarity level knowledge of techniques for environmental compliance-related sampling and monitoring.**

Supporting Knowledge and/or Skills

- a. Describe the types of equipment used to monitor a site for the following:
  - Ambient air quality
  - Emissions
  - Groundwater
  - Meteorological factors
  - Streams and rivers
  - Soil and sediment
  - Wildlife
- b. Explain the reason for measuring emissions, meteorological factors, and ambient air quality under the various operating conditions (e.g., routine, emergency).
- c. Describe the purpose for measuring each of the following parameters during field surveys of water quality:
  - Temperature
  - Dissolved oxygen
  - Conductivity
  - pH

- d. Discuss the factors that can affect readings, and the preservation methods for the field measurements listed above.
- e. Describe how trace toxic organics, volatile organics, and heavy metals are measured.

**1.34 EH Residents shall demonstrate a familiarity level knowledge of non-destructive testing techniques and methods.**

Supporting Knowledge and/or Skills

- a. Discuss the basic operating principles of the following common non-destructive examination techniques:
  - Visual
  - Radiography
  - Magnetic particle
  - Liquid penetrant
  - Ultrasonic
  - Eddy current
- b. Discuss the advantages, disadvantages, and inherent limitations of non-destructive examination methods.
- c. Describe the testing methods, such as soils and concrete tests, commonly used during construction and remediation activities.

**1.35 EH Resident personnel shall demonstrate a familiarity level knowledge of uninterruptible power supplies.**

Supporting Knowledge and/or Skills

- a. Discuss the purpose of an uninterruptible power supply.
- b. Discuss the types of emergency power sources used for an uninterruptible power supply.
- c. Discuss the purpose of a static inverter.
- d. Discuss the basic operation of a static inverter.
- e. Describe how to determine the state of charge of a battery used in an uninterruptible power supply.
- f. Given an uninterruptible power supply for a computer system, identify the maintenance requirements that ensure operability of the system.

**1.36 EH Resident personnel shall demonstrate a familiarity level knowledge of emergency power supplies and associated support systems.**

Supporting Knowledge and/or Skills

- a. Discuss the purpose of an emergency power supply.

- b. Discuss the types of emergency power supplies.
- c. Explain the sequence of events that occurs in shifting from normal to emergency power.
- d. Explain the sequence of events in shifting from emergency back to normal power supply.
- e. Identify the testing requirements of emergency power supplies.
- f. Given a condition in which an emergency power supply is taken out-of-service, discuss the technical requirements that must be satisfied for systems supplied by the emergency power supply.
- g. Discuss the purpose of diesel generator - related auxiliary systems.
- h. Given a lead acid battery emergency power supply, discuss the purpose of its related auxiliary systems.

## 2. REGULATORY

**NOTE:** When Department of Energy (DOE) directives are referenced in the qualification standard, the most recent revision should be used.

### 2.1 EH Residents shall demonstrate an expert level knowledge of the functions and responsibilities of the EH Resident as defined in Department of Energy (DOE) Order 5480.17, Site Safety Representative.

#### Supporting Knowledge and/or Skills

- a. Discuss the purpose of the DOE Order 5480.17, Site Safety Representative.
- b. Describe the applicability of the DOE Order 5480.17, Site Safety Representative.
- c. Define and discuss the concept of independent oversight.
- d. Describe the primary responsibilities of independent oversight of DOE Order 5480.17, Site Safety Representative, by the EH Resident as directed in Attachment 1.
- e. Describe the acceptable methods for on-site observations of facilities and operations.
- f. Describe the EH Resident's responsibilities for monitoring the status of Operations Office/Area Office programs for appraisal, review, and safety analysis.
- g. Discuss the methodology for reviewing contractor reports and notifications of incidents, events, or unusual occurrences.
- h. Describe the oversight and corrective action process of the EH Resident when observing the on-site interpretation and application of safety and health requirements and practices.
- i. Describe the reporting requirements of the EH Resident including report content, frequency, and point-of-contact.
- j. Discuss the attendance of the EH Resident at meetings which have safety implications.
- k. Discuss the protocol for interface between the EH Resident and the Field organization, contractor organization, and other agencies and groups.
- l. Describe the documentation support afforded to the EH Resident.
- m. Describe the facility access afforded to the EH Resident.
- n. Discuss the role of the EH Resident in scheduling appraisals and inspections.
- o. Discuss the role and responsibilities of the EH Resident in handling complaints in accordance with the requirements in DOE Order 5480.17, Site Safety Representative.
- p. Describe the appropriate response if a safety hazard is identified by an EH Resident in the field.

**2.2 EH Residents shall demonstrate a working level knowledge of Department of Energy (DOE) Order 5000.3B, Occurrence Reporting and Processing of Operations Information.**

Supporting Knowledge and/or Skills

- a. State the purpose of DOE Order 5000.3B, Occurrence Reporting and Processing of Operations Information.
- b. Define the following terms:
  - Event
  - Condition
  - Facility
  - Notification Report
  - Occurrence Report
  - Reportable occurrence
- c. Discuss the Department's policy regarding the reporting of occurrences as outlined in DOE Order 5000.3B, Occurrence Reporting and Processing of Operations Information.
- d. State the different categories of reportable occurrences and discuss each.
- e. Discuss the notification requirements associated with each of the categories of reportable occurrences. Include any associated time requirements, including, at a minimum:
  - Notification Report
  - 10-Day Occurrence Report
  - Final Report
  - Closing out and verifying Occurrence Reports
  - Processing Occurrence Reports
  - Contractor occurrence reporting procedures
- f. Discuss the general process for preparing and submitting occurrence reports and their follow-up.
- g. Given an occurrence report, determine whether:
  - Review process is adequate
  - Causes are appropriately defined
  - Corrective actions address causes
  - Lessons learned are appropriate
  - Corrective actions are completed
- h. Using an occurrence report involving environment, safety, and/or health, identify and discuss the factors contributing to the occurrence.
- i. Using Attachment 1 to DOE Order 5000.3B, Occurrence Reporting and Processing of Operations Information, discuss the role of the EH Resident in environment, safety, and health-related reportable occurrences.

**2.3 EH Residents shall demonstrate a familiarity level knowledge of the following Department of Energy (DOE) Orders:**

- **DOE Order 1700.1, Freedom of Information Program**
- **DOE Order 5480.6, Safety of DOE-Owned Reactors**
- **DOE Order 5480.7A, Fire Protection**
- **DOE Order 5700.6C, Quality Assurance**
- **DOE Order 5480.29, Employee Concerns**

Supporting Knowledge and/or Skills

- a. Discuss the purpose and scope of each of the Orders listed above.
- b. Discuss the applicability and impact of the above listed Orders on the EH oversight program.
- c. Describe the authorities and responsibilities of the EH Resident with respect to the above listed Orders.

**2.4 EH Residents shall demonstrate a familiarity level knowledge of the requirements for readiness reviews and start-up/restart of defense nuclear facilities in the listed Department of Energy (DOE) documents:**

- **DOE Order 5480.31, Start-up and Restart of Nuclear Facilities**
- **DOE-STD-3006-93, Planning and Conduct of Operational Readiness Reviews**

Supporting Knowledge and/or Skills

- a. Discuss the purpose and scope of the documents listed above.
- b. Discuss the applicability and impact on the EH oversight program of the above listed documents.
- c. Describe the authorities and responsibilities of the EH Resident with respect to the above listed documents.

**2.5 EH Residents shall demonstrate a familiarity level knowledge of transportation and safety requirements for radioactive and hazardous materials in the following Department of Energy (DOE) Orders:**

- **DOE Order 1540.2, Hazardous Material Packaging for Transport - Administrative Procedure**
- **DOE Order 1540.3A, Base Technology for Radioactive Material Transportation Packaging Systems**
- **DOE Order 5480.3, Safety Requirements for the Packaging and Transportation of Hazardous Materials, Hazardous Substances and Hazardous Wastes**

Supporting Knowledge and/or Skills

- a. Discuss the purpose and scope of the Orders listed above.

- b. Discuss the applicability and impact of the above listed Orders on the EH oversight program.
- c. Describe the authorities and responsibilities of the EH Resident with respect to the Orders listed above.

**2.6 EH Residents shall demonstrate a familiarity level knowledge of the requirements for hazardous and mixed waste management in Department of Energy (DOE) DOE Order 5820.2A, Radioactive Waste Management.**

Supporting Knowledge and/or Skills

- a. Discuss the purpose and scope of DOE Order 5820.2A, Radioactive Waste Management.
- b. Discuss the applicability and impact of DOE Order 5820.2A, Radioactive Waste Management, on the EH oversight program.
- c. Describe the authorities and responsibilities of the EH Resident with respect to DOE Order 5820.2A, Radioactive Waste Management.

**2.7 EH Residents shall demonstrate a familiarity level knowledge of the environmental requirements in the following Department of Energy (DOE) Orders:**

- DOE Order 5400.1, General Environmental Protection Program
- DOE Order 5400.4, Comprehensive Environmental Response, Compensation, and Liability Act Requirements
- DOE Order 5440.1E, National Environmental Policy Act Compliance Program
- DOE Order 5480.1B, Environmental, Safety, and Health Program
- DOE Order 5484.1, Environmental Protection, Safety and Health Protection Information Reporting Requirements

Supporting Knowledge and/or Skills

- a. Discuss the purpose and scope of the Orders listed above.
- b. Discuss the applicability and impact of the above listed Orders on the EH oversight program.
- c. Describe the authorities and responsibilities of the EH Resident with respect to the Orders listed above.

**2.8 EH Residents shall demonstrate a familiarity level knowledge of the requirements for occupational safety and health in the following Department of Energy (DOE) Orders:**

- **DOE Order 5480.8A, Contractor Occupational Medical Program**
- **DOE Order 5480.9A, Construction Safety and Health Program**
- **DOE Order 5480.10, Contractor Industrial Hygiene Program**
- **DOE Order 5483.1A, Occupational Safety and Health Program for DOE Employees at Government-Owned Contractor-Operated Facilities**

Supporting Knowledge and/or Skills

- a. Discuss the purpose and scope of the Orders listed above.
- b. Discuss the applicability and impact of the above listed Orders on the EH oversight program.
- c. Describe the authorities and responsibilities of the EH Resident with respect to the Orders listed above.

**2.9 EH Residents shall demonstrate a familiarity level knowledge of the requirements for radiation protection in the following regulation and Department of Energy (DOE) Orders:**

- **10 CFR 835, Occupational Radiation Protection**
- **DOE Order 5400.5, Radiation Protection of the Public and the Environment**
- **DOE Order 5480.11, Radiation Protection for Occupational Workers**
- **DOE Radiological Control Manual**

Supporting Knowledge and/or Skills

- a. Discuss the purpose and scope of the regulation and Orders.
- b. Discuss the applicability and impact of the listed regulation and Orders on the EH oversight program.
- c. Describe the authorities and responsibilities of the EH Resident with respect to the regulation and Orders.



**2.10 EH Residents shall demonstrate a familiarity level knowledge of safety requirements in the following Department of Energy (DOE) Orders:**

- DOE Order 5480.21, Unreviewed Safety Questions
- DOE Order 5480.22, Technical Safety Requirements
- DOE Order 5480.23, Nuclear Safety Analysis Reports
- DOE Order 5480.24, Criticality Safety
- DOE Order 5480.25, Safety of Accelerators
- DOE Order 5481.1B, Safety Analysis and Review

Supporting Knowledge and/or Skills

- a. Discuss the purpose and scope of the Orders listed above.
- b. Discuss the applicability and impact of the above listed Orders on the EH oversight program.
- c. Describe the authorities and responsibilities of the EH Resident with respect to the Orders listed above.

**2.11 EH Residents shall demonstrate a familiarity level knowledge of the requirements in Department of Energy (DOE) Order 5480.4, Environmental Protection, Safety, and Health Protection Standards.**

Supporting Knowledge and/or Skills

- a. Discuss the scope of the regulations, codes, and/or standards listed in DOE Order 5480.4, Environmental Protection, Safety, and Health Protection Standards.
- b. Describe the specific activities addressed in the regulations, codes, and/or standards listed in DOE Order 5480.4, Environmental Protection, Safety, and Health Protection Standards.
- c. Discuss the applicability of the regulations, codes, and/or standards to specific work activities.
- d. Given a scenario involving the verification of work activities to a standard, use DOE Order 5480.4, Environmental Protection, Safety, and Health Protection Standards, to identify the applicable standard(s).
- e. Given a specific question regarding the meaning of an Environment, Safety and Health (ES&H) standard or part thereof, provide an interpretation.

**2.12 EH Residents shall demonstrate a familiarity level knowledge of the management and negotiation of regulatory agreements and permits.**

Supporting Knowledge and/or Skills

- a. Describe the EH Resident's responsibilities with management of the following regulatory agreements:
  - Federal Facility Agreement
  - Consent Orders & Settlement Agreements
  - Record of Decision
  - Grant conditions
- b. Discuss the EH Resident's responsibilities with management of the following permits:
  - National Pollutant Discharge Elimination System permit
  - Resource Conservation and Recovery Act Part B permit

**2.13 EH Residents shall demonstrate a familiarity level knowledge of safeguards and security requirements in the following Department of Energy (DOE) Orders:**

- **DOE Order 5630.11B, Safeguards and Security Program**
- **DOE Order 5632.1C, Protection and Control of Safeguards and Security Interests**

Supporting Knowledge and/or Skills

- a. Describe the elements of protection and control planning.
- b. Discuss the general requirements for the protection of special nuclear material and vital equipment.
- c. Describe the general methods for protection and control of classified matter.
- d. Describe the requirements for security areas and protected access areas.
- e. Discuss the requirements of the following protection elements.
  - Intrusion detection and assessment systems
  - Access control and entry/exit inspections
  - Barriers and locks
  - Secure storage
  - Communications
  - Acceptance and validation testing
  - Maintenance
  - Posting notices
  - Security badges and credentials
  - Protective force

**2.14 EH Residents shall demonstrate a familiarity level knowledge of the requirements for nuclear material control and accountability in Department of Energy (DOE) Order 5633.3A, Control and Accountability of Nuclear Materials.**

Supporting Knowledge and/or Skills

- a. Discuss the basic requirements of material control and accountability.

- b. Describe in general how the Material Control and Accountability System provides a complete audit trail of all nuclear material from receipt through disposition.
- c. Describe the general requirements of the Material Control & Accountability program for physical inventory of nuclear materials.

**2.15 EH Residents shall demonstrate a familiarity level knowledge of Department of Energy (DOE) Order 1300.2A, Department of Energy Technical Standards Program.**

Supporting Knowledge and/or Skills

- a. Discuss the purpose of DOE Order 1300.2A, Department of Energy Technical Standards Program.
- b. Describe the policy and objectives set forth by DOE Order 1300.2A, Department of Energy Technical Standards Program.
- c. Given a copy of DOE Order 1300.2A, Department of Energy Technical Standards Program, identify the responsibilities of Departmental personnel.
- d. Discuss the general provisions of the Department's Technical Standards Program.
- e. Discuss the responsibilities of Departmental representatives with respect to Non-Government Standards.

**2.16 EH Residents shall demonstrate a working level knowledge of the requirements for a maintenance management program identified in Department of Energy (DOE) Order 4330.4B, Maintenance Management Program, Chapter II, Guidelines for the Conduct of Maintenance at DOE Nuclear Facilities.**

Supporting Knowledge and/or Skills

- a. Explain the intent of the DOE Order 4330.2B, Maintenance Management Program.
- b. Discuss the Department of Energy's policy and objectives for maintenance management.
- c. Describe the structures, systems, and components included in a maintenance management program.
- d. Discuss line management's responsibilities for the maintenance management program.
- e. Define the term "graded approach" and discuss its application to a maintenance management program.
- f. Discuss the application of Technical Safety Requirements in a maintenance management program.
- g. Discuss the management systems used to control maintenance activities.

- h. Describe the mechanisms for feedback of information (such as trend analysis and instrumentation performance/reliability data) to identify necessary program modifications.
- i. Discuss the importance of maintaining a proper balance of preventive and corrective maintenance.
- j. Define the following types of maintenance and give examples of each:
  - Corrective maintenance
  - Preventive maintenance
  - Predictive maintenance
- k. Discuss the elements needed to successfully implement a maintenance program balancing the three types of maintenance.
- l. Discuss the purpose and contents of a master equipment list.
- m. Discuss the relationship between the results of predictive maintenance and preventive maintenance.
- n. Describe some methods used for predictive maintenance.
- o. Discuss the considerations used when determining maintenance actions and their frequency.
- p. Describe the relationship in scheduling between preventive and predictive maintenance.

**2.17 EH Residents shall demonstrate a working level knowledge of the provisions of 10 CFR 820 Appendix A, General Statement of Enforcement Policy.**

Supporting Knowledge and/or Skills

- a. State the four purposes of the enforcement policy.
- b. Discuss the Department of Energy's statutory authority in enforcing Department nuclear safety rules, regulations, and Orders.
- c. Describe the procedural framework used by the Department in exercising its enforcement authority.
- d. Describe the actions the contractor must take when issued a Preliminary Notice of Violation.
- e. Describe the three levels of severity associated with Nuclear Safety Requirements.
- f. Discuss the "other factors" that will be considered by the Department in determining the appropriate severity of a violation.
- g. Describe how "adjustment factors" are used to reduce the amount of a base civil penalty.

- h. Describe the conditions under which the Department may "exercise discretion" and not issue a civil penalty for a violation.
- i. Discuss the requirements of subcontractors and suppliers to Department of Energy Price-Anderson indemnified contractors with regards to procurement of products or services and the reporting of defects.

**2.18 EH Residents shall demonstrate the ability to evaluate hazardous energy control programs in accordance with the following regulation and Department of Energy (DOE) Order:**

- **29 CFR 1910.147, Hazardous Energy Control**
- **DOE Order 5480.19, Conduct of Operations Requirements for DOE Facilities**

Supporting Knowledge and/or Skills

- a. Using the appropriate standard(s), identify the markings and guards required for a specific piece of electrical equipment.
- b. Describe the requirements and verify that the contractor's lockout/tagout program adequately addresses the following areas:
  - Use of lockout/tagout
  - Adequacy of procedures
  - Verification of lockout/tagout
  - Reenergizing equipment
  - Protection from shock/equipment start
  - Surveillance of the lockout/tagout program
  - Initial and annual training requirements
- c. Verify the specialized personal protective equipment and adequacy of worker qualifications for an activity involving hazardous energy.
- d. Identify one type of each of the following hazardous energy sources at your site:
  - Electrical
  - Mechanical
  - Pneumatic
  - Hydraulic
  - Thermal
  - Chemical
  - Radiation
- e. Given a hazardous energy source, describe the lockout/tagout requirements.
- f. Differentiate between the lockout/tagout requirements for the following:
  - Personnel protection
  - Equipment protection
  - Operations
  - Administrative
  - Confined space

- g. Define independent verification and discuss when independent verification is required.
- h. Given a lockout/tagout for a hazardous energy source, verify that the lockout/tagout adequately isolates the hazardous energy source.

**2.19 EH Residents shall demonstrate a working level knowledge of the requirements for training and qualification program(s) identified in the following Department of Energy (DOE) Orders:**

- **DOE Order 5480.20A, Personnel Selection, Qualification, Training, and Staffing Requirements at DOE Reactor and Non-Reactor Nuclear Facilities.**
- **DOE Order 3410.1B, Training**

Supporting Knowledge and/or Skills

- a. Describe the purpose and scope of the Orders listed above.
- b. Discuss why certain skills or proficiencies should be demonstrated periodically.
- c. Describe the changes to a program or process that require modification to a training program.
- d. Using DOE Order 5480.20A, Personnel Selection, Qualification, Training, and Staffing Requirements at DOE Reactor and Non-Reactor Nuclear Facilities, as a reference, describe the general requirements placed on Management and Operating (M&O) contractors at Category 1, 2, and 3 facilities in the following areas:
  - Qualification and certification of facility personnel
  - Training and qualification of sub-contractors
  - General employee training and unescorted access requirements
  - Continuing training and re-qualification
  - Exceptions and alternatives to requirements of the Order
  - Personnel selection
  - Training and qualification

**2.20 EH Residents shall demonstrate a working level knowledge of the requirements for the emergency management system in the following Department of Energy (DOE) Orders:**

- **DOE Order 5500.1B, Emergency Management System**
- **DOE Order 5500.2B, Emergency Notification, Reporting Requirements**
- **DOE Order 5500.3A, Reactor and Non-Reactor Nuclear Facilities Emergency Management Planning, Preparedness and Response Program for DOE Operations**

Supporting Knowledge and/or Skills

- a. Describe the key elements of Emergency Preparedness including planning, operations, principles, and methods.
- b. Explain the EH Resident's roles and responsibilities in emergency management and response to unplanned events.

- c. Explain the difference between the Occurrence Reporting and Processing System notification requirements and Emergency Management Systems event classification and notification requirements.
- d. Participate in and critique a site emergency exercise.

**2.21 EH Residents shall demonstrate a working level knowledge of the functions, assignment, and responsibilities of all levels of Department of Energy (DOE) personnel as defined in the Manual of Functions, Assignments, and Responsibilities for Nuclear Safety.**

Supporting Knowledge and/or Skills

- a. Discuss the purpose of the Manual of Functions, Assignments, and Responsibilities for Nuclear Safety.
- b. Given a copy of this Manual of Functions, Assignments, and Responsibilities for Nuclear Safety, discuss the format and content of the manual.
- c. Given a copy of the Manual of Functions, Assignments, and Responsibilities for Nuclear Safety, identify the sources used to compile the manual.
- d. Describe the procedure for submitting comments to this manual.
- e. Given a specific Department position and the manual, identify that person's function, assignment, and responsibility with regards to a specific DOE Order or other source contained in the manual.
- f. Given a scenario concerning an issue and a copy of the manual, determine the responsibilities of each Departmental management position.

**2.22 EH Residents shall demonstrate a working level knowledge of the Environment, Safety, and Health (ES&H) Appraisal Program as described in Department of Energy (DOE) Order 5482.1B, Environment, Safety, and Health Appraisal Program .**

Supporting Knowledge and/or Skills

- a. Discuss the Departmental policy set forth in DOE Order 5482.1B, Environment, Safety, and Health Appraisal Program.
- b. Describe the objectives of the Environment, Safety and Health Appraisal Program.
- c. Outline the conduct, activities, and staffing requirements for the following types of appraisals:
  - Management appraisals
  - Technical safety appraisals
  - Functional appraisals
  - Internal appraisals
  - Environmental survey
  - Environmental audit

- d. Discuss each of the generic factors to be considered and applied in the Environment, Safety and Health Appraisal Program.

**2.23 EH Residents shall demonstrate a working level knowledge of the Engineered Safeguard Features (ESF) and environmental monitoring sections and/or requirements of Department of Energy Order 6430.1A, General Design Criteria, Division 1, General Requirements and Division 13, Special Facilities.**

Supporting Knowledge and/or Skills

- a. Discuss the use of Division 1, General Requirements, in the identification of design requirements associated with Environmental, Safety, and Health concerns.
- b. Describe the purpose, scope, and application of the requirements detailed in Division 13, Special Facilities.
- c. Discuss the relationship between industry standards and Division 13, Special Facilities.
- d. Discuss the relationship between the American National Standards Institute (ANSI) standards and Division 13.
- e. Discuss what constitutes a safety class item.
- f. Discuss the application of single failure criteria to Division 13, Special Facilities.
- g. Discuss the environmental qualification criteria for Division 13, Special Facilities.
- h. Discuss the Division 13, Special Facilities, General Requirements related to the EH Resident's responsibilities with regards to:
  - Radiation protection
  - Confinement systems
  - Waste management
  - Effluent control and monitoring
- i. Given a Special Facility, identify the design criteria associated with its confinement systems, waste management, and effluent control and monitoring.



### **3. ADMINISTRATIVE**

#### **3.1 EH Residents shall demonstrate a working level knowledge of communications (both oral and written) when working or interacting with the contractor, media, stakeholders, and other internal and external organizations.**

Supporting Knowledge and/or Skills

- a. Identify the various internal and external groups with whom EH Residents must interface in the performance of their duties.
- b. Describe the media that may be utilized to communicate with these groups.
- c. Using actual file footage from the Public Affairs Office, view news media and critique the interviewees' actions.
- d. Participate in a mock media interview with a Public Affairs representative.
- e. Discuss proper techniques of media interaction.

## 4. MANAGEMENT, ASSESSMENT, AND OVERSIGHT

**NOTE:** When Department of Energy (DOE) directives are referenced in the qualification standard, the most recent revision should be used.

**4.1 EH Residents shall demonstrate an expert level knowledge of assessment techniques such as the planning and use of observations, interviews, and document reviews to assess facility performance, report results of assessments, and follow up on actions taken as the result of assessments.**

### Supporting Knowledge and/or Skills

- a. Describe the role of EH Residents role in performing oversight of Government-Owned Contractor-Operated (GOCO) facilities.
- b. Describe the assessment requirements and limitations associated with an EH Resident's interface with contractor employees.
- c. Conduct an interview representative of one which would be conducted during an occurrence investigation.
- d. Discuss the difference between a surveillance and a review.
- e. Explain the essential elements and processes associated with the following assessment activities:
  - Exit interviews
  - Closure process
  - Tracking to closure
  - Follow up
  - Contractor corrective action implementation
- f. Describe the actions to be taken if the contractor challenges the assessment findings and explain how such challenges can be avoided.
- g. Participate in formal meetings between Department of Energy management and senior contractor management to discuss results of EH Resident surveillance or reviews.
- h. Explain the essential elements of performance-based and compliance-based surveillance/reviews including the areas of investigating, fact-finding, and reporting.
- i. Discuss the techniques for developing the content of lines of inquiry.
- j. Given a set of requirements or requirement document, prepare a line of inquiry.
- k. Discuss the techniques for maintaining control of an interview.
- l. Discuss "objective evidence" including identification of various types and their relative accuracy.
- m. Describe the importance of note taking and gathering other documentation as the surveillance/review proceeds.

- n. Describe the surveillance/review alternatives when actual work cannot be observed.
- o. Discuss the means for determining the adequacy and effectiveness of the area (topic) being evaluated including the type of finding and significance of deficiencies.
- p. Describe what constitutes an issue.
- q. Describe the criteria for determining the significance of issues.
- r. Discuss the types of issues that warrant prompt notification to management personnel of both contractor and the Department.
- s. Discuss use of recommendations and observations that do not involve/constitute issues.
- t. Discuss the difference between the inductive surveillance/review process and the deductive reporting process.
- u. Discuss the ethical liability and responsibilities of the assessor.
- v. Given an issue and response, determine the acceptability of the response and the further actions needed.
- w. Discuss the difference between the performing oversight and providing technical assistance.

**4.2 EH Residents shall demonstrate a working level knowledge of the Department of Energy/facility contract provisions necessary to provide oversight of a contractor's operations.**

Supporting Knowledge and/or Skills

- a. Discuss the oversight role of the EH Resident.
- b. Given a copy or portion of an operating contract, discuss the Department's expectations of the Management and Operating (M&O) contractor in an area related to Environment, Health, and Safety.
- c. Identify the key elements of an effective relationship between the Department and an operating contractor.
- d. Describe the responsibility of the EH Resident with contractor compliance under the Price-Anderson Amendments Act.
- e. Describe the role of Departmental line management with respect to the award fee evaluation.
- f. Describe the interface responsibilities of the EH Resident with regards to the contractor(s) and the field element.
- g. Explain the EH Resident's responsibilities under DOE Order 5480.29, "Employee Concerns," in identifying, reporting, reviewing, and documenting employee concerns.

**4.3 EH Residents shall demonstrate a working level knowledge of the principles and techniques of problem analysis necessary to identify problems, determine potential causes of the problems, and identify corrective action(s).**

Supporting Knowledge and/or Skills

- a. Describe and explain the application of problem analysis techniques including the following:
  - Root Cause Analysis
  - Causal Factor Analysis
  - Change Analysis
  - Barrier Analysis
  - Management Oversight Risk Tree Analysis
- b. Describe and explain the application of the following root cause analysis processes in the performance of occurrence investigations:
  - Events and causal factors charting
  - Root cause coding
  - Recommendation generation
- c. Describe the following types of investigations and discuss an example of the application of each:
  - Type A
  - Type B
  - Type C
- d. Discuss the immediate, short term, and long term actions taken as the result of a problem identification or an occurrence.
- e. Describe various data gathering techniques and the use of trending/history when analyzing problems.
- f. Given event and/or occurrence data, apply problem analysis techniques and identify the problems and how they could have been avoided.

**4.4 EH Residents shall demonstrate a working level knowledge of program/project management practices and the application of contractor resources to meet commitments to occupational safety and health, nuclear safety, quality, cost and schedule in accordance with Department of Energy (DOE) Order 4700.1, Project Management System.**

Supporting Knowledge and/or Skills

- a. Explain the purpose of project management within the Department, and describe the life cycle of a typical project.
- b. Describe the primary roles and responsibilities of EH Residents consistent with the requirements in DOE Order 4700.1, Project Management System.

- c. Describe typical documents and data sources utilized in project management.
- d. Identify and explain the major elements of a project, and discuss their relationship.
- e. Explain the purpose and use of a project management plan (PMP).
- f. Discuss the role of configuration management as it relates to project management.
- g. Discuss the role of quality assurance as it relates to project management.
- h. Explain the use of safety plans in the management of projects.
- i. Discuss the relationship between work breakdown structure (WBS) and cost and schedule.
- j. Describe the purpose and use of work packages and/or planning packages.
- k. Describe the purpose of schedules and discuss the use of milestones and activities.
- l. Describe the critical path method of scheduling.
- m. Explain the concept of a project management baseline and describe the three baselines used in project management.

**4.5 EH Residents shall demonstrate the ability to apply problem analysis techniques to identify problems, determine potential causes of problems, and identify corrective actions.**

Supporting Knowledge and/or Skills

- a. Given event or occurrence data, apply problem analysis techniques and identify the problems and how they could have been avoided.
- b. Participate in a Type A, B, or C investigation.
- c. Participate in a contractor or Department of Energy problem analysis and critique the results.
- d. Using the appropriate data, interpret two fault tree analyses.

**4.6 EH Residents shall demonstrate the ability to conduct inspections on the use of personal protective equipment (PPE).**

Supporting Knowledge and/or Skills

- a. Given a type of personal protective equipment, demonstrate the proper use (donning and doffing) of the equipment.
- b. Given a respirator for use, verify that the equipment is in good working order, the routine inspection has been performed, and the respirator is appropriate for the specified activity/environment.
- c. Conduct an assessment of one or more of the following areas of a personal protective equipment program.
  - Written procedures
  - Respirator selection
  - User training
  - Respirator cleaning
  - Respirator storage
  - Inspections

**4.7 EH Residents shall demonstrate the ability to assess independently contractor and/or Federal employee environment, safety and health-related activities in accordance with the requirements of the following Department of Energy (DOE) Orders and Standard:**

- DOE Order 4330.4B, Maintenance Management Program
- DOE Order 5480.17, Site Safety Representative
- DOE Order 5480.19, Conduct of Operations Requirements for DOE Facilities
- DOE Order 5480.31, Start-up and Restart of Nuclear Facilities
- DOE-STD-3006-93, Planning and Conduct of Operational Readiness Reviews

Supporting Knowledge and/or Skills

- a. Establish the criteria to be used as a basis for conducting the assessment.
- b. Establish the points-of-contact with the field organization being assessed.
- c. Gather information pertinent to the evaluation by interviewing personnel, observing related activities, and reviewing records.

- d. Document the results of data collection in field notes.
- e. Compare the results of the review phase with the criteria established for the assessment and determine if deficiencies exist.
- f. Document the results of the overall assessment in a formal written report which includes the status of meeting the established criteria, identifies deficiencies or good practices, and suggests recommendations for improvement.
- g. Resolve conflicting or inconclusive observations or findings obtained from other evaluators on the assessment team.
- h. Verbally report the results of the evaluation to contractor facility management and DOE management.
- i. Perform follow-up activities as applicable to ensure implementation of corrective actions, including tracking and close-out.

**4.8 EH Residents shall demonstrate a familiarity level knowledge of contract management to establish contractor evaluation requirements and assess contractor performance.**

Supporting Knowledge and/or Skills

- a. Discuss the "Cost Plus Award Fee" evaluation process including the development of performance criteria, conduct of evaluations, and documentation and transmittal requirements for performance.
- b. Discuss typical criteria, performance measures, and means to communicate the importance of the contractor evaluation performance criteria.

## **EVALUATION REQUIREMENTS**

The following requirements shall be met to complete the Department-wide EH Resident Functional Area Qualification Standard. The evaluation process identified below serves as a measurement tool for assessing whether the participants have acquired the technical competencies outlined in this Standard.

1. Documented completion of the Department-wide General Technical Base Qualification Standard in accordance with the requirements contained in that standard.
2. Documented completion of the competency requirements listed in this functional area qualification standard. Documentation of the successful completion of these competency requirements may be satisfied by a qualifying official using any of the following methods:
  - Documented evaluation of equivalencies
  - Written examination
  - Documented oral evaluation
  - Documented observation of performance

## **CONTINUING TRAINING AND PROFICIENCY REQUIREMENTS**

EH Residents shall participate in an Office/facility/position-specific continuing training and qualification program that includes the following elements:

1. Technical education and/or training covering topics directly related to the duties and responsibilities of EH Residents as determined by line management. This may include courses and/or training provided by:
  - Department of Energy
  - Other Government agencies
  - Outside vendors
  - Educational institutions
2. Training covering topics that address identified deficiencies in the knowledge and/or skills of EH Residents.
3. Training in areas added to the EH Resident Functional Area Qualification Standard since initial qualification.
4. Specific continuing training requirements shall be documented in Individual Development Plans (IDPs).